3. The sequence $u_1, u_2, u_3, \ldots$ satisfies

$$u_1 = 5 \qquad u_{n+1} = \frac{3}{2}u_n - \frac{1}{2}u_n^2 + 4$$

(a) Show that this sequence is periodic, stating its period.

(3)

(b) State the value of u_{200}

(1)

(c) Find, showing all steps of your working, the value of

$$\sum_{r=1}^{200} u_r$$

(3)

(Total for Question 3 is 7 marks)

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4. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

The curve C has equation

$$y = 2x^3 + 7x + \frac{3}{x}$$

(a) Find the exact values of the x coordinates of the stationary points of C.

(4)

(b) Hence find the exact range of values of x for which C is increasing.

(2)

(Total for Question 4 is 6 marks)